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⑤4白色の硬質合成樹脂製押出成形物の製法

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明細書

1．発明の名称

白色の硬質合成樹脂製押出成形物の製法

2．特許請求の範囲

硬質合成樹脂材料100重量部と、漂白木粉とセルロースパウダーとの一方又は両方の合計約40重量部と、白色顔料5～10重量部と、安定剤とを混練してペレットを得、このペレットを押出成形機の押出金型より押出すことを特徴とする白色の硬質合成樹脂製押出物成形物の製法。

3．発明の詳細な説明

〈技術分野〉

本発明は、白色の硬質合成樹脂製押出成形物の製法に関する。

〈従来技術〉

上記硬質合成樹脂製押出成形物、例えば硬質塩化ビニール、ポリプロピレン、ABS等押出成形物は、熱膨張係数が大であるため、この値をアルミニウムのそれに近付けるために成形時に木粉を添加している。しかし木粉を添加すると硬質合成樹脂製押出成形物は茶色くなつたり、茶色の木粉が表面に目視されるので、これを台所、浴室用建材やしきい等に用いると清潔感が失なわれる問題があつた。

〈目的〉

そこで、本発明は、白度が70～90の押出成形物を提供することを目的としたものである。

〈構成〉

すなわち、本発明は、硬質合成樹脂材料100重量部と、漂白木粉とセルロースパウダーとの一方又は両方の合計約40重量部と、白色顔料5～10重量部と、安定剤とを混練してペレットを得、このペレットを押出成形機の押出金型より押出すことを特徴とするものである。

なお、前記木粉の組成は主には繊維質のセルロースであるが、それ以外にもリグニン、ペントサン、マンナン、ガラクタン及びタンパク質等のやに分が含まれている。厄介なことに木材の品種によつてその成分比率が異なる為に成形する段階で問題(ガス発生により硬質合成樹脂の分解を促進

させたり、色焼けの原因となる)が生じ易い。

そこで、本発明では硬質合成樹脂に木粉を多量にブレンドする際に問題となる(イ)ガス発生による成形時の吐出むら及び色焼けによる色調むら、(ロ)木粉の中に多量に含まれている水分によって生じる発泡現象等を改善する為に、木粉の選定及び改質処理を下記の通り試みた。

(a) 比較的やに分の少ない木粉(例えば、かば)を選ぶ。

(b) 木粉に含まれているやに分の除去及び脱色(H_2O_2による漂白)を行なう。

(c) 気流乾燥方法によって木粉中の水分を除去し、これを2～3%に調整する。

(d) 白色成形物を得るが為に脱色した木粉(100メッシュ)と市販しているセルロースパウダー(100メッシュ、例えば山陽国策パルプ(株)製商品名 パルプフロックW1)との混合ブレンドを行なうか、又はこれらを単独で用いる。

〈実施例〉

四実施例A,B,C,Dは次の表1の通りである。

表 1

	A	B	C	D
硬質塩化ビニール材料	100	100	100	100
($\bar{P}$=1100ストレート)				
漂白木粉(白度65)	40	26	14	0
セルロースパウダー	0	14	26	40
(白度80以上)				
重質炭酸カルシウム	10	10	10	10
トリベース	2	2	2	2
Pb－St	4	4	4	4
E-102	1	1	1	1
エポキシ大豆油	1	1	1	1
複合滑剤	1.5	1.5	1.5	1.5
ゲル化促進剤	0.3	0.3	0.3	0.3
グラフトマーまたは	5～20	5～20	5～20	5～20
塩素化ポリエチレン				
ルチル型酸化チタン	5～10	5～10	5～10	5～10
白度	70	75	80	80～90

次に木粉100kgの漂白方法を説明する。

漂白工程

①反応釜に清浄な水450ℓを入れ、所定温度(70～80℃)に加温する。

②反応釜を撹拌しながら木粉(含水率を10%とする)100kgを加える。

③水30ℓに水酸化ナトリウム2.7kg、3号けい酸ソーダ2.88kg、$MgSO_4 \cdot 7H_2O$ 0.09kgを加え溶解する。この水溶液を反応釜に添加しよく混合する。

④35%過酸化水素20.6kg(18.2ℓ)を加え、漂白反応を開始する。なお、過酸化水素水を添加する場合、発泡を伴うことがあるので充分に注意しながら徐々に加える事。

⑤反応釜にすべての薬剤等が入ると溶量が約600ℓとなる。所定温度に保ち、次のような目安で漂白時間を決める。

漂白温度 70℃のとき2時間30分反応

漂白温度 80℃のとき2時間反応

中和工程

⑥所定温度で漂白後、加温をやめる。

⑦反応釜に10%－H_2SO_4水溶液を徐々に加えPHが5～6になるように中和する。

⑧さらに反応釜に水270ℓを加え数分間撹拌する。

⑨遠心分離機に中和水洗いした木粉を入れ脱水を行なう。

⑩廃水は適当に処理する。

乾燥工程

⑪第1図に示す如く含水率20～30%のおから状態の木粉を気流乾燥機にて2～3%の含水率にまで乾燥を行なう。なお、図中21はバーナ、22は熱風、23はホッパー、24は木粉、25はスプリング製フイーダー、26はブロア、27はサイフォン、28は乾燥木粉である。

これにより漂白木粉94.1kg、絶乾漂白木粉85.5kg、歩留り95%にて得られる。

造粒工程

気流乾燥にて2～3%の含水率にした木粉を即座に表1の配合処方に基づいてミキサー(容量2

００ℓ、仕込量１００ℓ)にその他の原料と同時に仕込み、１００℃高速運転にてホットブレンドを行なう。次にドライアップしたセルロースパウダーを強制喰込み装置の付いたホッパーに入れ下記混練機にて造粒(ペレット化)を行なう。

混練機

シリンダ径:６５㎜/㎜、ベント式、L/D２８

加工条件

表２

加熱ゾーン	C_1	C_2	C_3	C_4	C_5	D
設定温度(℃)	110	145	145	130	130	130
指示温度(℃)	110	145	145	130	120	135

スクリーン無し

スクリュー回転　６４RPM

モータ負荷　５２A

押出量　８４～８７kg/hrs

樹脂圧　１２５～１３０kg/cm²

真空ポンプ　７２０㎜Hg

押出成形工程

得られたペレットはそのままにしておくと湿気を帯び易い為に長期間保存しておく場合は、使用する前に充分な乾燥を必要とする。

充分乾燥したペレットを下記押出機にて異型押出加工を行なう。

押出機

シリンダ径:６５㎜/㎜、２軸異方向回転

ベント式、L/D１８

加工条件

表３

加熱ゾーン	C_1	C_2	C_3	C_4	AD	D
温度(℃)	150	155	160	166	172	177

メインスクリュー回転　２０．５RPM、３２A

フイダー回転　６．７RPM、２３A

フルベント、スクリーン無し

押出金型

複雑な異型の場合は樹脂の特性上、流れが不均一になる場合があるが、本配合では特に木粉と塩化ビニールとの相溶性が悪い為に不均一な成形物(外観上及び物性的に問題有り)になり易い。この改善策としてはスクリューダイを使用する方法がある。

サイジング

空冷バキユームサイジング使用。

〈効果〉

以上の説明から明らかな通り、本発明は、硬質合成樹脂材料１００重量部と、漂白木粉とセルロースパウダーとの一方又は両方の合計約４０重量部と、白色顔料５～１０重量部と、安定剤とを混練してペレットを得、このペレットを押出成形機の押出金型より押出すことを特徴とするものであるから、本発明によると、白度が７０～９０の押出成形物を提供できる優れた効果がある。

４．図面の簡単な説明

第１図は、気流乾燥工程図である。

２１:バーナー、２２:熱風、２３:ホッパー、２４:木粉、２５:スプリング製フイダー、２６:ブロア、２７:サイフォン、２８:乾燥木粉。

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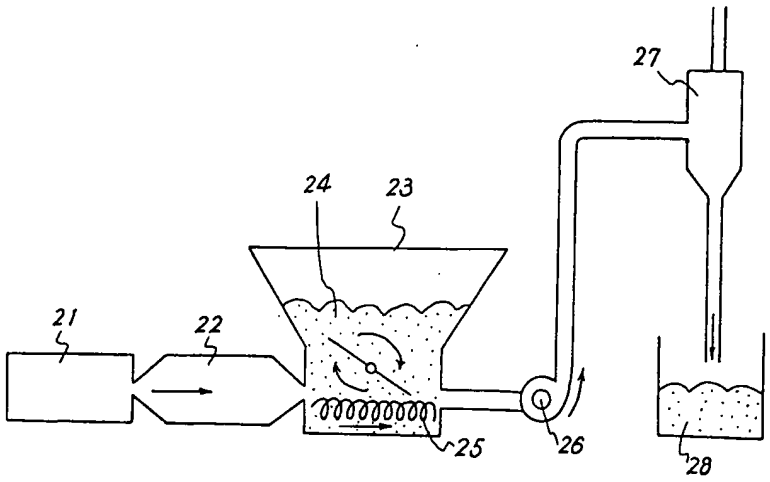
第1図



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(54) Name of the Invention: WHITE HARD SYNTHETIC RESIN EXTRUSION MOLDING COMPOUND MANUFACTURING METHOD

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Specifications:

1. Title of the Invention: White Hard Synthetic Resin Extrusion Molding Compound Manufacturing Method

2. Scope of the Patent's Claim

A method to manufacture a white hard synthetic resin extrusion molding compound, characterized by the fact that a pellet is obtained through kneading of 100 parts by weight of a hard synthetic resin material, and of a total of 40 parts by weight of bleached wood flour or cellulose powder, wherein either one component or both components can be used, together with 5 ~ 10 parts by weight of a white pigment and a stabilizing agent, wherein this pellet is then subjected to extruding through an extruding die of an extruding machine.

3. Detailed Explanation of the Invention

This invention relates to a method to manufacture a white hard synthetic resin extrusion molding compound.

(Sphere of Technology)

Since the above mentioned hard synthetic resin extrusion molding compounds, for instance compounds made of hard vinyl chloride, polypropylene, ABS, or similar types of extrusion compounds are characterized by a large thermal expansion coefficient, wood flour is added during molding because the value of the thermal expansion coefficient of such compounds is close to that of aluminum. However, when wood flour is added, this creates a light brown color of the hard synthetic resin extrusion compound and since the wood flour component is clearly visible on the surface of the product, the problem is that this interferes with the perception of cleanliness which is important for interiors such as kitchens, bathrooms, etc.

(Purpose)

The purpose of this invention is to provide an extrusion molding compound with a whiteness in the range of 70 ~ 90.

(Structure)

Specifically, this invention is characterized by the fact that a pellet is obtained through kneading of 100 parts by weight of a hard synthetic resin material, and of a total of 40 parts by weight of pure wood flour or cellulose powder, wherein either one component or both components can be used, together with 5 ~ 10 parts by weight of a white pigment; and this pellet is then subjected to extruding using an extruding die of an extruding machine.

In addition, although the composition of said wood flour can be comprised of fibrous cellulose, it is also possible to include another component, such as lignin, pentosan, mannan, galactan, etc. The disadvantage of wood components, however, is the fact that depending on the ratio of this component, it can easily cause problems during the formation stage (it can cause acceleration of the decomposition of a hard synthetic resin due to generation of gases).

That is why this invention attempted to improve the selection and quality of wood flour by the processes mentioned below in order to resolve problems connected with the so called foaming phenomenon, which is caused by generation of gas during molding, which is then discharged and which causes discoloration and irregular color formation when a large amount of wood flour is present in a hard synthetic resin (1), and also by taking measures aimed at improving the quality of the product by preventing foaming which is caused by a water content present in large quantities in wood flour (2). This was achieved by testing of the following measures.

(a) By selecting a relatively small amount of wood flour (using for example birch wood flour for this purpose.

(b) By removing the tar content present in wood flour in order to achieve decolorization (through bleaching with H_2O_2).

(c) By removing the water content present in wood flour according to the air current drying method in order to adjust this content amount to 2 ~ 3%

(d) By blending decolorized wood flour (100 mesh) with commercially available cellulose powder (100 mesh, using for instance Sanei Kokusaku Pulp K.K. Company product for this purpose, product name Pulp Flock W1), in order to obtain a white molded compact, or by using each of these components singly.

(Embodiments)

Four embodiments of this invention, indicated by letters A, B, C, and D are described in Table 1 below.

Table 1

	A	B	C	D
Hard Vinyl Chloride Material (β = 1100 straight)	100	100	100	100
White Wood Flour (Whiteness 65)	40	26	14	0
Cellulose Powder (Whiteness More Than 80)	0	14	26	40
Calcium Carbonate	10	10	10	10
Tribase	2	2	2	2
Pb-δt_2	4	4	4	4
E-102	1	1	1	1
Epoxy Soy Bean Oil	1	1	1	1
[illegible] Agent	1.5	1.5	1.5	1.5
Gelling Accelerating Agent	0.3	0.3	0.3	0.3
Graftomer or Chlorinated	5 ~ 20	5 ~ 20	5 ~ 20	5 ~ 20
Rutile Titanium Oxide	5 ~ 10	5 ~ 10	5 ~ 10	5 ~ 10
Whiteness	70	75	80	80 ~ 90

The following is an explanation of a method for using bleaching with 100 kg of wood flour.

Bleaching Process

(1) After the reaction boiler was filled with 450 l of clean water, heating was applied at the specified temperature (70 ~ 80°).

(2) 100 kg of wood flour (with a moisture content ratio of 10%) was added while stirring was applied in the reaction boiler.

(3) 2.7 kg of sodium hydroxide, 2.88 kg of siliceous soda No. 3, and 0.09 kg of $MgSO_4 \cdot 7H_2O$ was added to 30 l of water and dissolved in it. This aqueous solution was then added to the reaction boiler and thoroughly mixed.

(4) 20.6 kg (18.2 l) of 35% hydrogen peroxide was added and a bleaching reaction was initiated. In addition, when hydrogen peroxide is added, it must be added very carefully and gradually because this can be accompanied by foaming.

(5) When all the chemical ingredients, etc., are added to the reaction boiler, the content amount of the liquid in the boiler will reach approximately 60 l. While a specified temperature is

maintained, the following criteria are determined for the bleaching time period.

Bleaching temperature: The reaction should be conducted for 2 hours and 30 minutes at 70°C.
Bleaching temperature: The reaction should be conducted for 2 hours at 80°C

Neutralization Stage

After bleaching has been conducted at a specified temperature, the heating is discontinued.

(7) An aqueous solution containing 10% of H_2SO_4 is gradually added to the reaction boiler in order to adjust the pH level to 5 ~ 6 and to achieve neutralization.

(8) In addition, 270 l of water is added to the reaction boiler and stirring of its content is performed for several minutes.

(9) The wood flour which was immersed in the neutralization solution is dehydrated in a centrifugal separation device.

(10) The waste water is treated by a suitable treatment.

As shown in Figure 1, drying was conducted in an air current drying device in order to obtain a dry wood flower with a moisture content ratio in the range of 2 ~ 3% from wet wood flour whose moisture content ratio was in the range of 20 ~ 30%. In addition, number 21 shown in the figure indicates a burner, 22 is hot air, 23 is a hopper, 24 indicates wood flour, 25 is a spring feeder, 26 is a blower, 27 is a siphon, and 28 indicates dry wood flour.

After this procedure, 94.1 kg of bleached wood flower, and 85.5 of very dry bleached wood flower was obtained with a yield of 95%.

Particle Manufacturing Stage

Wood flour with a moisture content ratio in the range of 2 ~ 3% after drying with an air current drier which was prepared according to the compounding procedure shown in Table 1 was than mixed in a mixer (capacity 200 l, feed amount 100 l), while other material was also fed into the mixer, and high speed drying operations were conducted with a hot blade at 100°C. Next, dried up cellulose powder was forcibly fed with a hopper and pellet particles were prepared (through pelletization) with a kneading device.

Kneading Device

Cylinder diameter: 65 m/m, bent kneader, L/D 28.

Processing Conditions

Table 2

Heating Zone	C_1	C_2	C_3	C_4	C_5	D
Set Temperature (C°)	110	145	145	130	130	130
Indicated Temperature (C°)	110	145	145	130	120	135
No Screen						
Screen Rotations	64 RPM					
Motor Load	52 A					
Extruded Amount	84 - 87 kg/hrs					
Resin Pressure	125 - 130 kg/cm^2					
Vacuum Pump	720 mmHg					

Extrusion Molding Stage

If the pellet obtained in this manner is left as is and it is stored for a long time, sufficient drying is required before the pellet can be used because it can be easily stretched by warm air under these conditions.

A well dried pellet is then processed through the extrusion molding process using two different types of dies for this purpose.

Extruding Device

Cylinder diameter: 65 m/m, biaxial rotations in two directions, bent type, L/D 18.

Processing Conditions

Table 3

Heating Zone	C_1	C_2	C_3	C_4	C_5	D
Set Temperature (C°)	150	155	160	166	172	177
Main Screen Rotations	10.5 RPM, 32 A					
Feeder Rotations	6.7 RPM, 23A					
fully bent, no screen						

Extruder Die

Since non-homogenous characteristics of the resin and of its flow can sometime result when different types of dies are used, a non-homogenous molded compact can be easily produced when the above indicated blending is used, in particular because wood flour is not easily dissolved with chlorinated vinyl (which can result in a poor external appearance and poor physical characteristics and other problems). That is why a screen die was used as a measure aimed at an improvement in this respect.

Sizing

The sizing processing method was based on air-cooled vacuum sizing.

(Effect)

As was explained above, this invention provides a method to manufacture a white hard synthetic resin extrusion molding compound, characterized by the fact that a pellet is obtained through kneading of 100 parts by weight of a hard synthetic resin material, as well as a total of 40 parts by weight of bleached wood flour or cellulose powder, wherein either one component or both components can be used, together with 5 ~ 10 parts by weight of a white pigment; and this pellet is then subjected to extruding using an extruding die of an extruding machine. This invention thus makes it possible to obtain an extrusion molding compact with excellent characteristics resulting in a whiteness of 70 ~ 90.

4. Brief Explanation of Figures

Figure 1 is a diagram explaining the air drying stage.

21: burner, 22: hot air, 23: hopper, 24: wood flour, 25: spring feeder, 26: blower, 27: siphon, 28: dry wood flour.

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